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FORECASTING OUTBREAKS OF THE PALE WESTERN CUTWORM IN ALBERTA*

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The Pale Western Cutworm (*Porosagrotis orthogonia* Morrison) has been causing serious losses to grain crops in Alberta since 1911 and has appeared in certain sections of the prairies in the United States since 1915 in injurious numbers. Owing to its peculiar habit of feeding almost entirely below the surface of the ground, ordinary control measures have, on the whole, proved useless. The important control at present consists of cultural practices designed to prevent oviposition in fields to be cropped the following season.

Since the Pale Western Cutworm seldom comes to the surface of the soil, and usually feeds only on the more tender underground portions of the plants, parasitism is usually low. Predatory insects and birds are the most persistent enemies but their combined efforts are almost negligible as control factors under dry weather conditions.

It has been noticed frequently that the percentage of parasitized cutworms varies greatly from year to year as does the number of species of insects responsible for parasitism. This was especially true in 1915 when Mr. E. H. Strickland, at that time Entomologist in charge of the Dominion Entomological Laboratory at Lethbridge, Alberta, made the prediction that owing to the high percentage of parasitized cutworms collected during that summer in southern Alberta there would be no outbreak in 1916. During the past season (1922) observations have been made by the writer in the vicinity of Lethbridge, Alberta, which show a similar condition, though the general parasitism does not indicate that there will be a total absence of cutworms next season but rather that a substantial reduction in the numbers will occur. The most striking observation was not the high percentage of parasitized larvae but the large number of species of parasites involved. Under the weather conditions that have existed in southern Alberta for the last five years, the main parasites of *P. orthogonia* have been two species of tachinids and an occasional braconid. The rearing records for 1922 show that in addition to these parasites there also occurred a bombyliid, a chalcid, two ichneumonids, and another tachinid, all being species which are commonly associated with surface feeding noctuids. There was nothing to indicate that these parasitic insects were any more numerous than usual, but the conditions for their obtaining access to the larvae of *P. orthogonia* were more favorable. It is known that wet weather brings the larvae of the

*—Contribution from the Division of Field Crop Insects, Entomological Branch, Dept. of Agric., Ottawa.

Pale Western Cutworm to the surface of the ground where they remain until the surface soil starts to dry out. Such weather conditions occurred frequently throughout May and June, 1922, the normal period of activity of the larvae and at these periods they were at the mercy of many of the parasitic insects which seldom reach them under the surface. It is also noticeable that when the soil is wet the cutworms feed on the entire plant instead of only on the tender portion below ground. This increases the chances of parasitism from eggs deposited by those species of parasites which normally lay on the foliage of the plant.

There has apparently been no increase or decrease in the numbers of parasites from year to year but the increase in parasitized *P. orthogonia* larvae can be distinctly correlated with the number of days in May and June when cutworms are forced to the surface because of moisture. It should be possible to determine to some extent the presence or absence of cutworms for any year by the number of wet days during the preceding May and June combined.

Under normal conditions for May and June in the vicinity of Lethbridge, 0.25 of an inch of rain is sufficient to make a "wet" day, which can best be defined as a day when the soil is too wet to be easily worked and cutworms are moving about on the surface. The amount of moisture which constitutes a wet day will vary with the subsequent weather conditions and the type of soil. These must be taken into consideration when any work is being done with precipitation records. Accurate information can only be secured by checking the days at the time of taking the weather observations. A review of the daily precipitation records for May and June at Lethbridge, Alberta, from 1909 to 1922, gives the following results in "wet" days for two months.

| Year | Number of Wet Days |
|------|--------------------|
| 1909 | 10 |
| 1910 | 2 |
| 1911 | 15 |
| 1912 | 5 |
| 1913 | 15 |
| 1914 | 4 |
| 1915 | 18 |
| 1916 | 19 |
| 1917 | 6 |
| 1918 | 2 |
| 1919 | 6 |
| 1920 | 5 |
| 1921 | 5 |
| 1922 | 10 |

A review of the reports of Pale Western Cutworm abundance at Lethbridge shows that they first appeared in injurious numbers in 1911, which followed 1910 with only two days wet enough to bring the larvae to the surface. With 15 wet days in 1911 it was found that the infestation dropped to almost nothing in 1912 but rose again in 1913 and dropped in 1914. In 1915 there was a heavy infestation but the excessive moisture caused much of the grain to

recover after being cut, and the loss was very small. The two years of 1916 and 1917 were practically free of any cutworm infestation, but 1918 showed a marked increase, which reached a climax in 1922. The damage during 1922 was not severe because of the opportune rainfall, which caused grain to recover after being cut by the larvae.

Since Lethbridge is the only place in Alberta where Pale Western Cutworm infestation reports and daily precipitation charts are complete and authentic, it was necessary to secure records from Montana in order to amplify and supplement our notes. The daily precipitation records were secured from the U. S. Weather Bureau station at Helena, Montana, and other sources, while the cutworm distribution data were kindly furnished by the Montana Experiment Station at Bozeman.

Weather records from eighteen localities in Montana where cutworm distribution reports are also available show almost the same result as the Lethbridge observations. These records cover a period of six years for many localities, and there are well over one hundred instances by which it is possible to check the number of wet days with the increase or decrease of cutworms.

A review of all the data shows that any year which has less than ten wet days in May and June is followed by corresponding increase in the infestation of *P. orthogonia*. Years which have from ten to fifteen wet days are followed by some decrease, while years with more than fifteen wet days are followed by an almost total disappearance of the pest. It must be remembered that these wet days are obtained from tabulated data with little knowledge of the accompanying weather conditions and that actual observations might change the results to a certain extent. This past season the weather records for Lethbridge showed ten wet days, where as an actual fact there were fourteen days when cutworms were moving about on the surface for some part of the day, and this same fact might apply to any year of any locality.

It must be noted that while rain is actually falling, parasites are not active, but the two tachinids, *Bonnetia compta* and *Gonia capitata*, which are the most abundant of the parasites of *P. orthogonia*, lay their eggs on the leaves of vegetation. The increase of these species in parasitized cutworms is due to the fact that wet weather causes the cutworms to feed on the leaves above ground. The direct parasites become active as soon as the rain is over, and, while being the chief instruments of control with the common surface feeding cutworms of many species, are an important factor in the control of *P. orthogonia* during that period when they are on the surface following rain and previous to their return beneath the soil.

This basis for forecasting the presence of *P. orthogonia* in districts where it is known to occur to some extent, is apparently sufficiently accurate for all practical purposes, to enable every farmer to determine for himself by July first whether or not these cutworms will be present in injurious numbers the following year. When he has made this determination he can govern his cultural practices for the remainder of the summer in a way to avoid undue losses the following season.

SOME STUDIES ON THE GENUS *HYDROMETRA* IN AMERICA
NORTH OF MEXICO WITH DESCRIPTION OF A NEW SPECIES
(HYDROMETRIDAE, HEMIP.)

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A short time ago I published a little note in the Bulletin of the Brooklyn Entomological Society calling attention to the presence in Kansas of both *H. martini* Kirk. and *H. australis* Say. It seemed to me important to note the fact in connection with *H. australis* Say, which had been recorded from Georgia, Florida and Louisiana only. The Kansas record therefore greatly increased the known range of this insect. The other species, *H. martini* Kirk., had been previously reported from Kansas (Hungerford, Kansas Science Bulletin XI), and is known to have a wide range over our country. The occurrence of *H. australis* Say in various parts of Kansas (Cherokee County, Douglas County and Riley County) suggests the likelihood that it, too, must have a considerable range and is being confused with *H. martini* Kirk. in various collections. These studies are presented to aid in a more satisfactory recognition of these insects by drawing attention to characters hitherto used in their differentiation, and to add a third species not previously described.

Say recognized two kinds of *Hydrometra* in this country: one which he called *H. lineata*, and the other, which he considered a variety of it, *H. lineata* var. *a. australis*. J. O. Martin, in 1900 (Can. Ent. XXXII, pp. 70—76), published a study on the life history of *Hydrometra lineata* Say and pointed out differences between it and the European *H. stagnorum*. Shortly after this, Kirkaldy (Entomologist XXXIII, pp. 175—190) reported that the name *H. lineata* Say was preoccupied by *H. lineata* Eschsch, 1822, from Manilla, and proposed the name *H. martini* Kirk. for this insect. In 1905, J. R. de la Torre Bueno (Can. Ent XXXVII, pp. 12—14) gave some rearing notes on *H. martini* Kirk., and from the study of a single male of Say's variety *australis*, pointed out specific differences between the two kinds, thus raising *H. australis* Say to specific rank. He also presented drawings of the terminal segments of the two species. Nevertheless, so far as I know, Professor H. G. Barber* is the only one who has reported *H. australis* since that time, and our knowledge of the tangible specific differences has rested upon Mr. J. R. de la Torre Bueno's study of the solitary male. The examination of numerous specimens of *H. australis* Say bears out his studies and justifies the addition of other characters for distinguishing the species.

The shape and position of the elevations on the ventral side of the sixth abdominal segment of the males serve to separate the three species (see Plate I, Figs 7, 8 and 9). They may also be separated by the number and arrangement of the pits on the pleura above the coxæ.** The thorax of *Hydrometra* is more or less pitted, but the number of pits on the side of the bug above the coxæ is quite characteristic and fairly constant, sufficiently so to be of considerable help in determining the species and has the added value of pertaining to both sexes (see Figures 1, 2 and 3). The original descriptions of the two previously described species are short and therefore repeated here for the convenience of the worker, and amplified by more recent studies.

*—Bul. Am. Mus. Nat. Hist. XXVIII, p. 300, 1914.

**—I refer to those located on either side of the pro and mesocoxal clefts.

Hydrometra martini Kirk., 1900.

"Fuscous; hemelytra dull whitish with black nervures.

Inhabits United States.

Body fuscous, or brown, more or less deep; hemelytra dull whitish or dusky, with black nervures: wings opaque white, with black nervures: tergum pale, quadrilineate with black; two of the lines on the edge and the interval between the two inner lines dull whitish or bright yellow; the incisures of the segments more or less black: beneath and feet obscure yellowish: thorax with more or less obvious pale line.

"Length seven-twentieths of an inch.

"This is very much like the *stagnorum* F., but the hemelytra are not testaceous, and there is no thoracic impressed line.

"(Male?) Body blued-black; thorax with pale line; antennæ and feet dark honey-yellow; tergum and venter without lines."

Say's description from Complete Writings, Vol. I p. 361.

Notes:

J. O. Martin noted that the males of this species have the terminal segment abruptly swollen toward the tip as viewed from above, and that this bears a well marked spiniferous tubercle. He also noted the two thin, plate-like elevations on the ventral side of the sixth abdominal segment (see Figs. 5 and 12). A study of material from Kansas (various localities), Texas, Louisiana, Minnesota and New Jersey shows that the species is further characterized by having normally, two pits on the pleura above the pro- and mesothoracic coxæ in both sexes, and by the front femora usually not reaching the front of the head. Some species have faint, whitish spots on the sides of the abdomen, which in *H. australis* Say are very conspicuous. In fully winged specimens a longitudinal white line extends down the dorsum. In some this is very marked.

Hydrometra australis Say.

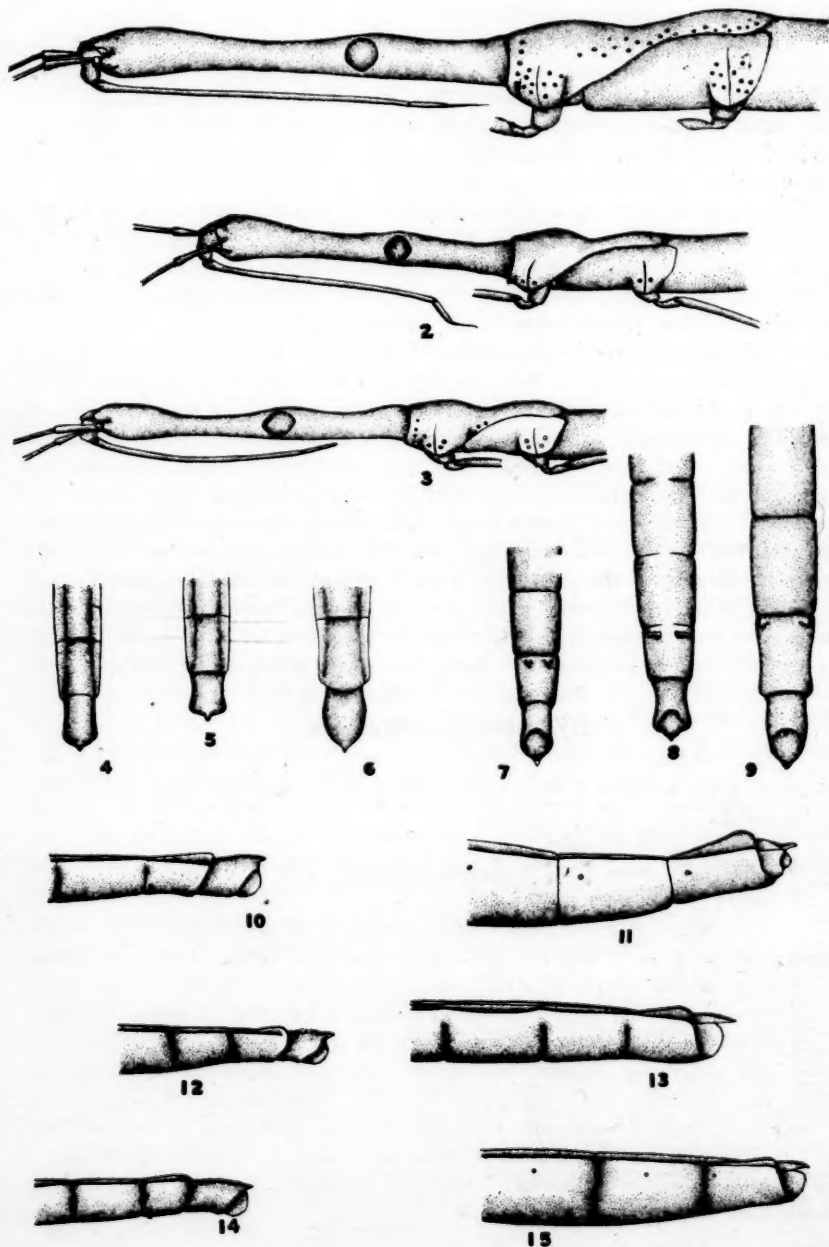
"Head beyond the eyes a little longer and a little more dilated at tip; second joint of the antennæ a little more dilated at tip; abdomen with five lateral whitish points.

"Inhabits New Orleans."

Say's Description from Complete Writings, Vol. I, p. 361.

Notes:

Bueno noted that the male terminal segment as seen from above is not abruptly swollen as in *H. martini* Kirk., that the tubercle it bears is not prominent and that the lateral margin is straight and not sinuate as in *H. martini* Kirk. This last is often difficult to see. Material from three localities in Kansas (Cherokee, Douglas and Riley Counties) shows that the males have on the ventral side of the sixth abdominal segment, two conical elevations instead of shallowly but broadly notched ridges (see Figs 7 and 8). The front femora are about as in *H. martini*. There are normally four pits above the pro- and mesocoxæ (see Fig. 3). Those on the mesothorax are more constant as to number and arrangement than those on the prothorax. The tip of the abdomen of the female is less elongate than that of *H. martini* Kirk.



NORTH AMERICAN HYDROMETRINAE.

***Hydrometra wileyi* sp. nov.**

Size: Length from 13.5 mm. in case of small males, to 15.5 mm. in case of the females, much larger therefore than the other two species described from the United States.

Color: General fascies dark, color and pattern variable, dorsum lighter than venter; in the fully winged forms the wings are usually light brown with darker brown veins, sometimes they are grayish; head and thorax brown above; the abdomen in brachypterous forms usually dark above as well as beneath, the sides of the abdomen usually marked by a more or less definite lighter line in which are situated five or six white or pale spots.

Structural characteristics: The relative lengths of the three body regions are as follows: For the ♀ head: thorax: abdomen:: 4: 4.5: 6+; for the ♂ head: thorax: abdomen :: 4: 4.25: 5.5; the antennæ in both sexes average 7 mm. in length with the ratio for the four segments as follows: 1st: 2nd: 3d: 4th: : : 22: 32: 90: 48. The ratio of the postocular portion of head to the anteocular portion is approximately as 3: 5, the tip of the rostrum extends behind the eyes to a point near the middle of the postocular portion of the head; the distal end of the fore femur in most specimens attaining or surpassing the base of the antenna, the distal end of the hind femur in both sexes usually reaching to caudal end of sixth abdominal segment, and in the males, often to tip of abdomen. The antennæ are approximately half the length of the body, the first segment is slender at base but much thicker in its outer part and extends beyond the head two-thirds of its length, the second and succeeding segments slender; the tylus is rounded as viewed from above, the anterior portion of the head is swollen as with the other species; between the eyes above and beneath are distinct depressions, the postocular portion of the head distinctly thicker than the section before the eyes; the thorax is irregularly marked with whitish pits and there is an impressed longitudinal line of these pits on pronotum, another post-marginal row about the anterior margin of the prothorax and numerous irregularly placed pits on the sides above the coxae. The species varies from fully winged forms through all stages to entirely apterous individuals; the sixth segment of the female is thickened, the dorsum more elevated than in the other species; the last dorsal plate is short and depressed across the middle; the sixth segment of the male has a pair of short, widely separated elevations on its ventral side; the seventh segment is slightly swollen about its middle as seen from above. See figures 1, 6, 9, 10 and 11.

Notes:

This large and distinctive species is about the size of the one Champion describes under the name *Hydrometra caraiba* Guer. It differs from this in the rostrum being longer, the antennæ shorter with segments of different relative lengths and the anteocular portion of the head relatively shorter. Neither does it agree with any other species described from the Americas. Besides being considerably larger than our previously described United States species, the appendages are more elongate, the first segment of antennæ extends beyond the head two-thirds of its length while in our other two species it projects only about one-half its length, the tylus is broadly rounded as viewed from above while it is bluntly pointed in our others. The following table will serve to separate the three species now recognized from the United States:

KEY TO HYDROMETRA IN AMERICA NORTH OF MEXICO.

- A. Pits above middle coxa numerous and irregularly placed, length more than 13 mm. ($13\frac{1}{2}$ — $15\frac{1}{2}$ mm.) (See Fig. 1) *H. wileyi* sp. nov.
- AA. Pits on side above middle coxa seldom more than four, length less than 12 mm. (8—11 mm) (See Figs. 2 and 3).
- B. Pits on side above middle coxa normally two, terminal segment of male abruptly swollen toward tip as seen from above, under side of the sixth segment in male with two thin, plate-like elevations *H. martini* Kirk.
- BB. Pits on side above middle coxa normally four, terminal segment of male not abruptly swollen toward tip as seen from above, under side of sixth segment in male with two conical elevations *H. australis* Say.

The description of the new species, *H. wileyi*, was drawn from a study of a series of 362 specimens collected by Mrs. Grace Wiley, near Rock Island, Colorado County, Texas. The holotype, allotype and paratypes are in the University of Kansas collection. Paratypes have been sent also to U. S. N. M., Carnegie Museum, Canadian National Collection, Ottawa, Canada, Cornell University, University of Minnesota, and the following private collections: Mrs. Grace Wiley, Mr. J. R. de la Torre Bueno, Dr. H. M. Parshley, Professor H. G. Barber, R. F. Hussey, Dr. Carl Drake, W. E. Hoffmann and my own collection.

EXPLANATION OF PLATE

- Fig. 1. Side view of head, pro- and mesothorax of *Hydrometra wileyi* sp. nov.
 2. Side view of head, pro- and mesothorax of *Hydrometra martini* Kirk.
 3. Side view of head, pro- and mesothorax of *Hydrometra australis* Say.
 4. Dorsal view of terminal abdominal segments of male of *Hydrometra australis* Say.
 5. Dorsal view of terminal abdominal segments of male of *Hydrometra martini* Kirk.
 6. Dorsal view of terminal abdominal segments of male of *Hydrometra wileyi* sp. nov.
 7. Ventral view of terminal abdominal segments of male of *Hydrometra australis* Say.
 8. Ventral view of terminal abdominal segments of male of *Hydrometra martini* Kirk.
 9. Ventral view of terminal abdominal segments of male of *Hydrometra wileyi* sp. nov.
 10. Side view of terminal abdominal segments of male of *Hydrometra wileyi* sp. nov.
 11. Side view of terminal abdominal segments of female of *Hydrometra wileyi* sp. nov.
 12. Side view of terminal abdominal segments of male of *Hydrometra martini* Kirk.
 13. Side view of terminal abdominal segments of female of *Hydrometra martini* Kirk.
 14. Side view of terminal abdominal segments of male of *Hydrometra australis* Say.
 15. Side view of terminal abdominal segments of female of *Hydrometra australis* Say.

THE STENOSYRPHUS SODALIS GROUP (SYRPHIDAE, DIPTERA)*

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The genus *Stenosyrphus* Mats. is distinguished from *Syrphus*, in which all the North American species have previously been included, by the sides of the abdomen curving under and not being margined. The eyes of the *sodalis* group are hairy, face usually without a median black stripe, but in one species with one, or sometimes wholly black; cheeks and oral margin black; abdomen oval or elliptical, with three interrupted bands, the resultant spots slightly concave in front, convex behind; all the femora black basally in both sexes. The four closely related species may be distinguished as follows:

1. Face with a median black stripe, sometimes (in the ♂) wholly black
nigrifacies n. sp.
 Face not with a median black stripe, rarely slightly brownish 2
2. The first pair of spots do not attain the lateral margin; or legs not as in *sodalis* 3
 The first pair of spots reach the lateral margin; hind femora of both sexes black on at least the basal three-fourths; second pair of abdominal spots in ♂, wider than the following black band *sodalis* Will.
3. Hind femora black on not more than the basal third; front of female not nearly as wide at antennae as length from vertex to antennae *contumax* O.S.
 Hind femora black on basal four-fifths; front of female as wide at antennae as long *interruptus* Mall.

***Stenosyrphus sodalis* Williston.**

Synopsis N. Am. Syrph., p. 74.

Length 9—10 mm. *Male*. Face reddish or brownish yellow, thinly whitish pollinose, in profile very slightly receding, the tubercle large, sub-nose shaped, between the tubercle and antennae rather deeply concave, below the tubercle shortly and conspicuously concave to the prominent anterior oral tip; very slightly produced downwards. Cheeks and oral margin to the lower level of the tubercle, black; frontal triangle black, but obscured in certain lights, except just above the antennae, by greyish pollen; the yellow ground in which the antennae are inserted extends just onto the arms of the W. Vertical triangle rather dull black. Occiput next to the eyes grey pruinose. Pile on face, front and vertical triangle moderately long, black; on the middle of the face, occiput eyes and cheeks, yellowish. Antennae black, third joint reddish below, basally. Arista black.

Thorax metallic blackish blue, the disc more or less dull. Pile rather pale yellow, yellow on the margins of the dorsum; sometimes a few conspicuous black hairs on the upper end of the mesopleura. Scutellum translucent yellowish, the corners bluish black, sometimes a distinct metallic bluish reflection; pile black, not very abundant.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept., of Agric., Ottawa.

Femora black, the apical third to one-fourth of the front four and fifth of the hind ones, reddish yellow. Tibiae reddish yellow, the hind ones with a conspicuous black band occupying about the sub-apical half; the front four sometimes with distinct but narrower bands on apical half; tarsi all black or brown. Pile on the legs mostly yellow, but the long hairs behind the front four are black except basally. Front and hind foot cushions brassy yellow.

Wings hyaline or slightly brownish; stigma luteous or brownish. The costa ends just before the tip of the wing; the third vein is curved a little forward beyond the middle of the first posterior cell. Squamae translucent whitish, with almost white fringe, the border yellowish. Halteres yellow.

Abdomen opaque black, the lateral margins wholly, apex of the fourth and whole of the fifth segments shining; adorned with three pairs of yellow spots. First pair of spots broadly interrupted, sub-triangular (sometimes scarcely sub-triangular), their inner ends rounded, their anterior outer ends produced rather broadly to reach the margin at the anterior third. Second and third pair of spots narrowly interrupted, slightly concave in front, convex behind, their posterior corners rounded off, narrowly and distinctly separated from the lateral margin, but approaching it in front, or sometimes quite reaching the margin in front; the spots are narrowly separated from the anterior margin of the segment and are of greater width than the following black band; posterior margin of the fourth segment, large anterior angles of the fifth and the narrow apex of the fifth yellow. Pile black; before the first yellow spots, on all the yellow spots and on the side margins opposite them, yellow. Venter yellow; second and third segments with obscure, dark, rather large subtriangular median areas.

Female. Face reddish yellow; in profile less concave above, the tubercle longer, nose-shaped. Front shining greenish or bronze black, across the middle the colour obscured by greyish yellow to tawny pollen, leaving a shining arch above the antennae; just above the antennae a narrow arch of yellow. Pile of front all black but it may be paler laterally opposite the pollinose band; pile of face almost all pale; occipital pile almost white.

The thorax may be metallic blackish blue or more greenish black, and there is never any black hair on the pleura. Less black hair on the femora.

Abdominal spots narrower and less widely separated; the first pair of spots transverse, their inner ends rounded. On the fifth segment the basal spots are transverse and narrowly separated but not as wide as those on the fourth, sometimes they may be almost as in the male.

In other respects similar to the male.

Description from 12 specimens from Colorado, British Columbia, Alberta and Alaska. In addition I have examined specimens from New Mexico, Washington, Oregon and Idaho which agree perfectly, according to comparison.

This species was originally described from Colorado. It is distinguished from its allies by the first spots extending over the lateral margin, and the wider abdominal bands. In addition, it is distinguished from *nigrifacies* by lacking a median facial stripe; from *contumax* by having the hind femora black on the basal four fifths in the female and the wholly yellow pilose thoracic dorsum in

the male; from *interruptus*, of which only the female is known, by the much narrower front, and yellow pilose hind coxae.

***Stenosyrphus interruptus* Malloch.**

Syrphus sodalis var. *interruptus* Malloch, Rep. Can. Arct. Exped., 55C.

Malloch described this species as a variety of *sodalis* but was not at all sure of its identity, as he labelled one specimen as the variety with a query and included a third specimen under *sodalis*. There can be no confusion between the two species as the front is abnormally wide. None of the specimens are in good condition. I give the following description from these specimens, but it may not entirely agree with perfect ones. The male should be distinguished by having black pile on the hind coxae in addition to the other characters.

Length, 8 to 9 mm. *Female*. Face shining reddish, with a deep bluish reflection in some lights; perpendicular, the tubercle nose shaped, large and prominent; not or scarcely concave above it, shortly and shallowly concave below, the anterior oral margin just a little prominent; scarcely any trace of swelling just below the insertion of the antennae. Front shining black with strong brassy or bronze reflections; especially narrowly brassy across the middle, where there may be a light band of whitish, greyish or yellowish pollen. Width of front at antenna approximately 3 mm., at vertex 1.2 mm., length from base of antennae to vertex (not considering the convexity), 1.75 mm. (The same ratio is true of the two other specimens). Cheeks shining black. Face and front black pilose; occiput with yellow and black intermixed. Antennae black.

Thorax greenish black? the disc more or less opaque. Pile tawny or yellowish; conspicuous black hairs on the upper half of the mesopleura. Scutellum translucent yellow, its corners black; pile black.

Femora black; the apical third of the four front and fifth of the hind ones, reddish; tibiae reddish, the hind ones with a rather narrow brownish band near the middle; tarsi all brownish or black. Pile of legs pallid, yellowish; most of the long hairs on the femora black, but those on the basal area pale; sometimes about half pale on the hind ones.

Wings hyaline, stigma luteous; third vein joining the costa just before the tip of the wing. Squamae whitish with yellow border and fringe. Halteres reddish, sometimes a little infuscated.

Abdomen sub-opaque black, the side margins wholly, apices of the third and fourth segments and the fifth entirely, shining; with three pairs of transverse, rather narrow reddish yellow spots, the first pair broadly separated from each other and slightly less broadly so from the lateral margins, the third pair may or may not reach the margins, but the second pair appears to be distinctly separated. There appears to be an inclination for the spots to be much smaller and less distinct than in the type, in which specimen they are shaped as in *sodalis*, but are only about half the width, therefore occupying only about one-fourth the length of the segment. Narrow apices of the fourth and fifth segments and small anterior angles of the latter reddish. Pile black; in front of

the first pair of spots and on the yellow bands and margins opposite, yellow. Colour of venter indeterminate.

Described from three females from Alaska, including the type.

This species is very distinct from its allies and may be at once recognized by the broad front and black haired hind coxae. In the male the hind legs are probably all black except just the knees and abdominal bands are probably narrower than in the other species.

***Stenosyrphus nigrifacies* new species.**

Length 8 to 9 mm. *Male*. Face and front shining black; except a median line which extends just over the tubercle, the oral margin and an arch above the antennae, moderately yellowish or greyish yellow pollinose; sides of face above sometimes yellow on about one fourth the width; in the type wholly black. Face slightly receding in profile, the tubercle nose shaped and not very prominent, moderately concave above the tubercle, a little swollen just below the antennae, below the tubercle moderately long, shallowly concave, the anterior oral tip somewhat produced. Pile of face and frontal triangle black. Frontal triangle with more or less brassy reflection; vertical triangle rather dull black; with black pile. Occiput greyish pollinose, it and the cheeks yellow pilose. Eyes with short pallid pile. Antennae inserted on yellow ground, black; arista black, thickened on basal half.

Thorax metallic greenish or bluish black, the dorsum rather olivaceous. Pile black, possibly a few pale hairs intermixed between the humeri; lower half of pleura always and postalar calli sometimes, with yellow pile. Scutellum translucent yellowish or reddish yellow, with long black pile.

Legs black; narrow apices of the femora, bases of all the tibiae, the hind ones narrowly so, and apex of the front ones, reddish or yellowish. Pile of legs black, except on the front tibiae, hind coxae and the bases of the femora. Pubescence inside the front tibiae and beneath their tarsi, yellow, inside the hind tibiae and beneath their tarsi, tawny.

Wings brownish yellowish, fading out posteriorly; stigma brownish. Third vein ends in the tip of the wing. Squamae whitish with yellow border and fringe. Halteres yellow.

Abdomen subopaque black, the margins shining; with three pairs of transverse yellow spots. First pair of spots about the middle of the second segment, somewhat oblique as their outer end reaches forward, but is broadly separated from the lateral margin; in shape, sub-oval or sub-triangular-oval. Second and third pair of spots narrowly separated medianly, attenuated laterally, but reaching the margin in one-fourth to one-half the width of the spots, their anterior margin slightly concave, the posterior convex, the inner end rounded off behind, although on the third pair less so; fourth segment with a conspicuous yellow hind margin, the fifth with triangles, sometimes transverse and moderately separated, on the anterior angles, the hind margin of the segment not yellow. Pile moderately long, black; rather tawny or yellow before the basal spots; on the spots and just where they reach the margins, yellowish.

Venter with the membranes and sutures greyish yellow or somewhat hoary; each sternite has a yellow basal triangle on either side.

Female. The reddish yellow colour occupies slightly more than one third the width of the face on either side; the shining black middle stripe reaches up between the antennae, but is more brownish above. Face less concave above, the tubercle rather more robust but not quite so prominent. Pile of face and front all black. Front shining bronze black; on the sides below, extending less densely across the middle, tawny pollinose. The front is slightly longer than its width at the antennae, but appears much longer as the sides are sub-parallel above. Third antennal joint reddish below.

Thorax aeneous or brassy black, with wholly pale pile. Scutellum with yellow pile basally, black apically.

Front and middle tibiae brownish, their bases broadly and their apices yellow. Pile as in the male, but more extensively pale on the posterior four femora. Wings paler.

Abdomen more shining; first pair of spots longer, reaching the lateral margin moderately broadly just behind the anterior angles. (This character is probably somewhat variable). The remaining bands are slightly narrower than in the δ and more narrowed laterally, but they expand just on the lateral margin. The pile is shorter throughout. Otherwise as in the δ .

Holotype, δ , Banff, Alberta, July 14, 1922 (C. B. D. Garrett); No. 518, in the Canadian National Collection, Ottawa.

Allotype, η , Banff, Alta., July 15, 1922 (C. B. D. Garrett).

Paratype, δ , Banff, July 13, 1922 (C. B. D. Garrett).

This species is readily distinguished in both sexes by the dark face and cannot therefore be confused.

***Stenosyrphus contumax* Osten Sacken.**

Osten Sacken, Proc. Bost. Soc. Nat. Hist., 1875, P. 147.

Length 8.5 mm. to 9.5 mm. *Male.* Face reddish yellowish, a stripe running over the tubercle slightly brownish; cheeks, oral margin as high as the lower edge of the tubercle, and the frontal triangle, shining black. Face in profile moderately, long concave above, a moderately large swelling just below the antennae, tubercle prominent, sub-nose-shaped, below the tubercle shortly, shallowly concave, the oral tip a little produced; face very little receding. Frontal triangle thickly clothed with yellowish pollen, an arch above the antennae shining; the W mostly reddish, with a conspicuous red spot on the median arms. Pile of face, frontal and vertical triangles black, moderately long. Vertical triangle subshining black. Occiput yellowish grey pollinose, with yellow pile, cheeks yellowish pilose; occipital ciliae black. Antenna situated in yellow ground; black; third joint reddish below at the base; arista rather slender. Eyes with fine pale yellowish pile.

Thorax greenish black, the disc somewhat darkened. Pile rather tawny; on the dorsum inside the lateral margins usually with a longitudinal stripe of black hairs; these extend down before the suture and onto the upper posterior corner of the mesopleura; there are also a few scattered black hairs between

the humeri. Scutellum steel blue with just an indication of translucent yellowish; its pile black.

*Legs black; apical fifth of femora, basal half of front four tibiae and fourth of the hind ones, reddish; front four tibiae brownish on apical half. Pile yellowish; the long hairs on the femora, except on the basal half of the hind ones, black; hind tibiae with black hairs. Inner side of the front tibiae, inner apical fourth of the hind ones, and the front and hind tarsi beneath, tawny pubescent.

Wings somewhat luteous; stigma brown. Third vein ends just before the tip of the wing. Squamae whitish with a slight brownish tinge, with yellow border and fringe. Halteres yellow.

Abdomen opaque black; the side margins, apices of third and fourth and whole of the fifth segments, shining; with three pairs of transverse yellow spots, the first pair broadly, the other two pairs narrowly separated in the middle. First pair of spots near the middle of the second segment, a little oblique as they reach forward laterally, but are broadly separated from the lateral margin; inner ends rounded, front margin irregularly straight; hind margin convex. Second pair of spots widest sublaterally; anterior margin slightly concave, the posterior convex; inner end rounded; outer end cut off obliquely. Third pair of spots similar, but narrower and of more equal width. Apices of fourth and fifth segments, and anterior angles of the latter, reddish. None of the spots reach the side margins. Pile black; before the first pair of spots, on the yellow bands and opposite them, yellow. Venter yellow, each segment with a posterior fuscous crossband reaching forward in the middle to the anterior margin; that on the second segment obsolete laterally, so that only a fuscous triangle is left.

Female. Face more deeply concave above, the tubercle rather sharper. Front shining black, with bronze or brassy reflections except at the vertex and just above the antennae. On almost the lower half with a grey or yellowish pollinose crossband; gradually narrowing from the antennae to the vertex. Pile of face and front black.

Thorax often decidedly brassy, the dorsum with four or five narrow, longitudinal bronze or purplish stripes. Pile all yellow. Scutellum translucent yellow, with black pile.

Legs reddish; basal third of the femora and all the tarsi, black.

Wings hyaline or slightly luteous. Stigma luteous.

Abdomen sub-shining. First pair of spots longer, less widely separated. Normally none of the bands reach the margin, but all or the last two pairs may sometimes do so. Ventral spots small, usually restricted to median triangles. Otherwise as in the ♂.

Description from eleven specimens of both sexes from Labrador, Alberta and Colorado.

The specimens before me agree well with Osten Sacken's description, but the pile on the thorax is evidently paler in colour.

NEW WESTERN SPECIES OF *DOLERUS* (TENTHREDINIDAE
HYMENOPTERA)*

BY ALEX. D. MACGILLIVRAY,

Urbana. Ill.

The species of *Dolerus* of the eastern United States and Canada are well known, most of the species have been studied and described. The following descriptions are a first instalment of a number of western species that have been in course of study for some time. All the species here described were received from Professor A. L. Lovett of the Oregon State Agricultural College.

***Dolerus napæus* n. sp.**

Female. Body black, densely covered with long white setae; the antennae with the first segment of the flagellum slightly longer than the second; median fovea not well defined; the head ventrad of the ocelli closely punctured, the vertical orbits polished, the postocellar area sparsely punctured; the vertical furrows deep, broad, longer than wide; the dorsal aspect of the thorax uniformly closely punctured; the median lobe of the mesonotum without a row of large punctures; mesopleura coarsely punctured; the pectus without rows of punctures; the saw-guides with the dorsal margin convex, the ventral margin oblique, the distal portion convexly oblique, the apex above, short, truncately rounded; the wings hyaline, the veins and the stigma brown. Length, 10 mm.

Habitat. Corvallis, Oregon; G. F. Mozette and Johnson, collectors. This species is related to the *apriloides* group.

***Dolerus narratus* n. sp.**

Female. Body wholly black except a fine pale line on the caudal margin of the abdominal segments; the antennae with the first segment of the flagellum longer than the second; the head coarsely punctured, the vertical furrows elongate, punctiform depressions; the postocellar area more finely and densely punctured than the remainder of the head, the vertical orbits without ridges or depressions, but punctured; tops of the convexities of the lobes of the mesonotum smooth, polished; the mesoscutellum finely, densely punctured, no more densely punctured than the adjacent parts of the lateral lobes, but distinctly more densely punctured than the median lobe; the pectus not with rows of large punctures; the saw-guides with the ventral margin oblique, the distal end obliquely truncate, the apex above with long setae; the wings hyaline, the veins and the stigma brownish. Length, 9 mm.

Male. The male is identical in color and structure with the female.

Habitat. Mary's Peak, Corvallis, Oregon; collected by Lovett, Middlekauff, Crosby, Zwicker, and Ballard. The punctured vertical orbits of this species will separate it from *napæus* MacG.

***Dolerus nasutus* n. sp.**

Female. Body wholly black; the antennae with the first segment of the flagellum longer than the second; the head coarsely punctured, the front and

*—Contributions from the Entomological Laboratories of the University of Illinois, No. 73.

frontal orbits finely and closely; the vertical furrows elongate and punctiform depressions; the postocellar area not more finely punctured than the front, the punctures of the vertical orbits large, with a tendency to form rugosities; a deep, concave furrow extending from the vertical furrows to the compound eyes; median lobe of the mesonotum uniformly punctured, without an impunctate area; lobes of the mesonotum uniformly finely punctured, not so closely punctured as the mesoscutellum; the saw-guides convex on the dorsal margin and on the ventral margin, obliquely convexly rounded to a blunt point above, distal portion with long setae; the wings hyaline, the veins and stigma black. Length 10 mm.

Male. This sex appears to differ only in having the transverse furrow extending from the vertical furrows to the compound eyes not so broad or so deep. Length 9 mm.

Habitat. Corvallis, Oregon, Laura Hill, collector and Renton, Washington, H. F. Wilson, collector. This species is near *inspiratus* MacG.

***Dolerus nefastus* n. sp.**

Female. Body black with the prothorax, the tegulae, the median lobe of the mesonotum, the caudal half of each lateral lobe, sometimes extending along the sides so that each lobe appears to bear a discal black spot, sometimes with all of lateral lobes pale, and abdominal segments one to four, rufous; the antennae with the first segment of the flagellum distinctly longer than the second, the second and third subequal; the head punctate, the ocellar area and the frontal orbits finely densely punctate, the remainder of the head coarsely punctate, the punctation of the postocellar area and of the vertical orbits similar in size, a transverse furrow extending from the vertical furrows to the compound eyes; the mesonotum uniformly punctured, the mesopleura densely punctured; the striations of the scutellar appendage distinct; the saw guides with the dorsal and ventral margins parallel, the distal end obliquely truncate and bearing numerous long setae; the wings hyaline, the veins and the stigma black. Length, 9 mm.

Habitat. Corvallis, Oregon; Laura Hill, collector. This species is related to *inspiratus* MacG. and *nefastus* MacG.

***Dolerus nugatorius* n. sp.**

Female. Body entirely black, densely covered with long white setae, giving a hoary appearance to many parts; the antennae with the first segment of the flagellum slightly longer than the second, the second longer than the third; the front and frontal orbits finely densely punctured; the vertical orbits densely coarsely punctured; indication of a ridge extending from each vertical orbit toward a compound eye, head depressed in front of this ridge, but not forming a furrow; the postocellar area coarsely punctured; the median lobe of the mesonotum densely punctured, those along each lateral margin much larger; the lateral lobes of the mesonotum and the mesoscutellum finely sparsely punctate; the mesopleura coarsely punctate; the appendage of the scutellum coarsely transversely striate; the saw-guides with the dorsal and ventral margins straight, the

distal end oblique, convexly rounded, bluntly pointed at apex above; the wings hyaline, the veins and stigma black. Length, 9 mm.

Male. The male is not strongly punctate and the ridge on the head is almost wanting. Length, 9 mm.

Habitat. Pee Dee, Oregon, Vincent, collector; Mary's Peak, Corvallis, Oregon, A. L. Lovett, collector. The black color and the structure of the head and thorax will differentiate this species.

***Dolerus numerosus* n. sp.**

Female. Body black with a fine white line along the caudal margin of the abdominal segments pale; the antennae with the first segment of the flagellum distinctly longer than the second, the second and third subequal; the front and the frontal orbits finely densely punctate, the postocellar area finely punctate, the vertical orbits coarsely punctate; head without a furrow from the vertical furrows extending toward the compound eyes; the vertical furrows linear, almost wanting; the lobes of the mesonotum uniformly finely punctured, none of the punctations coarser than others; the mesoscutellum finely densely punctate; the mesopleura coarsely punctate; the saw-guides with the dorsal and ventral margins converging, the ventral margin convex, the apex pointed; the wings hyaline, the veins and the stigma black. Length, 10 mm.

Male. A male collected in the same month and bearing the same number is undoubtedly the male of this species. It has a broad furrow limited to the caudal margin of the compound eyes. Length, 9 mm.

Habitat. Corvallis, Oregon; H. S. Walters, collector. The punctation of the front, postocellar area, and the vertical orbits will separate this species from the preceding.

***Dolerus novellus* n. sp.**

Female. Body black with a very fine white line along the caudal margin of the abdominal segments; the antennae with the first segment of the flagellum much longer than the second, the second and third subequal; the front and frontal orbits finely densely punctate, the postocellar area finely punctate, the vertical orbits coarsely punctate; a deep furrow extending from the vertical furrows behind the compound eyes; the vertical furrows elongate deep pits with flaring sides; the median lobe of the mesonotum uniformly densely punctate, not with larger punctures along each side; the lateral lobes of the mesonotum and the mesoscutellum finely punctured; the mesopleura densely punctured; the saw-guides with the dorsal margin oblique, the ventral margin broadly convexly rounded to a sharp point above at apex; the wings hyaline, the veins and stigma black. Length, 10 mm.

Habitat. Mary's Peak, Corvallis, Oregon; received from A. L. Lovett, Hardman collector. This species runs to *abdominalis* Norton, from which it is easily separated by the black color.

***Dolerus novicius* n. sp.**

Female. Body black with the prothorax, the tegulae, the median and the

lateral lobes of the mesonotum, the apices of the profemora and mesofemora, the tibiae, the distal two-thirds of the metatibiae, the tarsi infuscated, and abdominal segments one to five and part of the sixth, rufous; the antennae with the first segment of the flagellum longer than the second, the second and the third subequal; the front and the frontal orbits finely densely punctured, the remainder of the head finely more sparsely punctate; a rounded furrow extending from the linear vertical orbits behind the compound eyes, the bottom of the furrows polished and sparsely punctate; the lobes of the mesonotum more sparsely punctate, the mesoscutellum finely densely punctate; the mesopleura coarsely punctate; the saw-guides with the dorsal and ventral margins straight, the distal end obliquely truncated, slightly convex, densely setiferous; wings hyaline, the veins and the greater part of the stigma black, the caudal margin pale. Length, 8 mm.

Habitat. Hood's River, Oregon, Childs Collector. This species is related to *aprilis* Norton.

***Dolerus nicaeus* n. sp.**

Female. Body entirely black, the head and thorax hoary in spots with long white setae; the antennae with the first segment of the flagellum nearly as long as the subequal second and third together; the front and frontal orbits finely densely punctate; the vertical orbits sparsely punctate, the punctures large; the vertical furrows punctiform; the head with a broad transverse furrow extending from the vertical furrows behind the compound eyes; median lobe of mesonotum closely punctate, not with a row of large punctures on each side; each lateral lobe uniformly punctate, not so densely as the median lobe; the mesoscutellum finely punctate; the mesopleura finely closely punctate; the pectus almost polished; the saw-guides with the dorsal margin straight, the ventral margin short and straight, the distal portion elongate, oblique, bluntly pointed above, setiferous; the wings slightly smoky, veins and stigma black. Length, 11 mm.

Habitat. Chilliwack, British Columbia; received from A. L. Lovett. This species is related to *nasutus* MacG.

***Dolerus nepotulus* n. sp.**

Male. Body entirely black, the head and thorax hoary with long white setae; the antennae with the first segment of the flagellum subequal in length to the second which is subequal to the third; the front and frontal orbits finely densely punctate; the postocellar area obscurely punctate, the vertical orbits broadly polished; the vertical furrows slit-like; the head not with a transverse furrow extending from the vertical furrows behind the compound eyes; the mesonotum with the median lobe uniformly punctate, not with a row of large punctures on each side; the lateral lobes of the mesonotum and the mesoscutellum finely punctate; the mesopleura coarsely sparsely punctate; the wings hyaline, the veins and the stigma black. Length, 7 mm.

Habitat. Linn County, Oregon; received from A. L. Lovett. This species is related to *nudus* MacG.

ON THE ECOLOGY OF *PODOPS CINCTIPES* SAY AND *RHYTIDOLomia SAUCIA* SAY, (HEMIPTERA, PENTATOMIDAE).*

BY H. M. PARSHLEY,

Northampton, Mass.

One of the exercises done by the class in field zoology at the Biological Laboratory, Cold Spring Harbor, Long Island, N.Y., is a detailed study of the animals of the "Jones Marsh," a small salt meadow, which is partially overflowed by seawater at times of high tide, and hence supports a special fauna and flora. Among the characteristic plants are *Spartina patens* (Ait.) Muhl., which forms a broad zone just behind the high water line, and *Juncus gerardi* Lois., marking the next zone away from the shore. With these plants, as we found during the past summer (July 27-28) are intimately associated the Pentatomids *Podops cinctipes* Say and *Rhytidolomia saucia* Say, insects whose habits are little known, although they are common in collections.

In habit of growth the two plants mentioned are somewhat similar—they form a thick-tangled thatch like coarse hair, which affords ideal shelter to various salt-marsh animals and renders ordinary collecting methods futile. If, however, the collector discards his net, and, kneeling, parts the thick mat of vegetation, he will find *Podops* and *Rhytidolomia* at home (on their respective plants), clambering about among the closely set stems from which they draw sustenance.

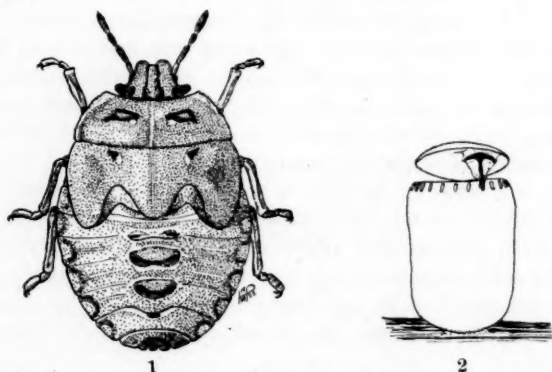
***Podops cinctipes* Say.**

This is a small, dark brown species, one of our few representatives of the subfamily Graphosomatinae (notable for the large scutellum), which is of wide distribution in the United States and Canada. Evidently it is not confined to salt marshes, and hence it is clear that *Juncus gerardi* is not its sole food-plant—doubtless other species of rushes will serve as well. Among the few published notes on the habits of *P. cinctipes* are statements that it has been found in "marshes," "meadows," "wet situations," and I have taken it under stones near salt water and in sweeping marsh plants. During the past summer, I found the nymphs in large numbers among the stems of *Juncus gerardi*, and, wishing to obtain adults for determination, I dug up a small tuft of the plant with its roots, placed it simply in a pint jar with nymphs of various sizes, and thus transferred a bit of the marsh to Northampton. This crude method proved successful: the mature insects appeared in due time, mated, and one laid a dozen eggs in a double row on a *Juncus* stem. The eggs hatched in about six days, but it was necessary to kill and preserve the young, as by this time the food-plant had withered, succumbing finally to two or three weeks' separation from its native soil.

The egg (fig. 2) is yellowish white, 1 mm. in length, cylindrical, rounded at bottom, and provided with a shallow lid. The surface is minutely reticulated and around the upper end is a series of about 26 very small chorial processes, which (at least after hatching) lie so closely against the surface that even under high magnification they appear merely as tiny white markings. The anchor-shaped egg-burster in a remnant of membrane is to be seen at the opening of each egg shell.

*—Contributions from the Department of Zoology, Smith College, No. 99.

The first stage nymph is about one mm. in length shortly after hatching, and is almost hemispherical in shape. The surface bears coarse, remote, dark punctures; the head, fourth antennal segment, thorax, area of the abdominal glands, marginal spots of abdomen, tarsi, and apices of femora are dark grayish brown, with bronzed lustre; the rest yellow. The head is a little broader than long, smoothly convex, the eyes scarcely projecting; the antennae are very short, the first three segments hardly longer than broad, the fourth about as long as the others together.



Podops cinctipes Say:—1, nymph of the fifth instar (x 15), 2, the egg after hatching (x 50).

Several later stages, collected in the field, presented a uniform and characteristic general appearance: in form they all agree rather closely with the fifth (fig. 1), being much less convex than the first. The general coloration is dark grayish brown, with bronzed lustre; on the pronotum are two small, yellow spots and the dark calli; at the basal angles of the scutellar region are two similar spots, flanked by small black areas, and the front wing-pads are more or less infuscated; the scent-gland areas and abdominal margin are distinctly patterned in black. The ground color of head, thorax, and abdomen is pale yellow, but the black punctures are so coarse and numerous as to produce a general dark effect.

In an intermediate stage (the third?) the eyes are distinctly prominent, the pronotum is but slightly shorter than the scutellum on the median line, the wing-pads are slightly developed, not reaching the level of the apex of scutellum, and the antennae are very stout, intermediate in this respect between those of the first and fifth instars.

The fifth stage nymph (fig. 1) is 5—6 mm. in length, and the form is but slightly convex, the abdomen being flat laterally. As in the older nymphs of *Nezara viridula* Linn.,¹ there appear to be light and dark forms, the former due to brown instead of black punctation, but in living specimens the difference is not striking and intermediates occur.

Studying this species in the light of Hart's keys² for Pentatomid nymphs, I find that abdominal spiracles 2—6 are accompanied each by but *one* setigerous puncture (trichobothrium of Tullgren), which is very distinctly developed.

1—Jones, T. H., The Southern Green Plant-bug, U. S. Dept. Agri., Bull. 689, 1918.

2—Pent. of Illinois, Bull. Ill. Nat. Hist. Surv., XIII, 1919.

whereas the other Pentatomidae have regularly *two*. This character, then, may be temporarily employed in interpolating the Graphosomatinae in Hart's key. I hope shortly to have some further information (drawn from European material) on the validity of this nymphal subfamily character.

***Rhytidolomia saucia* Say.**

This beautiful insect is one of the most striking and characteristic inhabitants of the "*Spartina patens* zone." Adults and nymphs occur in great abundance among the densely matted stems of the plant, where their presence would be quite unsuspected without special scrutiny. This species has been found only along the Atlantic coast, from Massachusetts to Florida, and I believe that it is confined to salt marshes, possibly to *Spartina patens*, as its sole food plant, since this grass occurs within the same limits.

The nymph (late stage) of *R. saucia* is easily recognized by its striking color pattern. The ground color is bright yellow, the surface provided with black and brown punctures and dots so small and sparse that they hardly affect the general light shade. The third antennal segment, except at base, and the fourth, are black, as are the eyes. The head and thorax bear four broad black stripes, the median pair, separated by a narrow mid-dorsal pale line, beginning faintly on the head and gradually broadening to the apex of the scutellum, the lateral beginning at the anterior margin of the pronotum just behind the eyes and similarly widening to the apices of the wing-pads. The scent-gland areas are black, and the dorsal surface of the abdomen, except for a narrow, pale margin, is dusky yellow, crossed by numerous narrow, and nebulous streaks of dark brown. In form this nymph is somewhat more elongate than *P. cintipes* (fig. 1), the head much larger in proportion and the scutellum much shorter. Specimens at hand measure 7—8 mm. in length.

In Hart's key the nymph of *R. saucia* runs to *Chlorochroa*, if we consider the scarcely impressed dotting of the abdominal tergum to be marks, not punctures; here it is readily distinguished by its bold color pattern, described above, and its elongate form.

ANNOTATED CHECK LIST OF THE MACROLEPIDOPTERA OF ALBERTA—ADDITIONS, 1921.

BY KENNETH BOWMAN,

Edmonton, Alta.

The following are additions during 1921 to the "Check List of the Macrolepidoptera of Alberta," published by the Alberta Natural History Society, Red Deer, Alberta, in 1919.

The identifications were made by Dr. Barnes, Dr. J. McDunnough, Messrs. Cassino and Swett, to whom I am much indebted for their kindness. The numbers refer to the month of capture, the letters are the abbreviations for the locality as given in the Check List.

| | | |
|-----|--|------|
| 65 | <i>Eurymus alexandra</i> Edw. | 7 N. |
| 129 | <i>Oenecis taygete</i> Hbn. | 7 N. |
| 219 | <i>Euphydryas anicia capella</i> Barnes | 6 Bm |
| 306 | <i>Basilarchia lorquini burrissoni</i> Mayn..... | 6 Bm |
| 432 | <i>Plebeius yukona</i> Holl. | 7 E. |

| | | |
|------|--|--------------------|
| 437 | <i>Plebeius lupini</i> Bdv. | 6 Bm. |
| 449 | <i>Glaucopsyche lygdamus columbia</i> Skin. | 6 Bm. |
| N.S. | <i>Neoarctia sordida</i> McD. | 6 B. |
| 1218 | <i>Copablepharon alba</i> Harv. | Lb. |
| 1259 | <i>Euxoa catenula</i> Grt. | Lb. |
| 1273 | <i>Euxoa intrita strigilis</i> Grt. | 8 E. |
| 1274 | <i>Euxoa rufula basiflava</i> Sm. | 8 L. |
| 1359 | <i>Euxoa westermanni</i> Staud. | 7 N. |
| N.S. | <i>Anomogyna partita</i> McD. | 7—8 C. L. P. N. E. |
| N.S. | <i>Anomogyna homogena</i> McD. | 7—9 B. P. N. |
| 1516 | <i>Apharetra dentata</i> Grt. | 7 N. |
| 1548 | <i>Mythimna olivata</i> Harv. | 8 L. |
| 1652 | <i>Lasionycta subfuscula</i> Grt. | 6 Bm. |
| 2022 | <i>Oncocnemis albifasciata</i> Hamp. | Lb. |
| 2043 | <i>Graptolitha tepida atincta</i> Sm. | 4 E. |
| 2588 | <i>Platyperigia anotha</i> Dyar | 8 L. |
| 2596 | <i>Crambodes talidiformis</i> Gn. | Lb. |
| 2613 | <i>Menopsimus caducus</i> Dyar. | 7 N. E. |
| 2790 | <i>Bellura diffusa</i> Grt. | 6 E. |
| 3012 | <i>Sarrothripus revayana lintnerana</i> Spey. | 9 E. |
| 3057 | <i>Catocala verecunda</i> Hlst. | Lb. |
| 3227 | <i>Autographa diasema borea</i> Auriv. | 7 N. |
| 3562 | <i>Bomolocha bijugalis</i> Wlk. | 7 E. |
| 3571 | <i>Bomolocha toreuta</i> Grt. | 7 E. |
| 3670 | <i>Cerura occidentalis gigans</i> McD. | 4—6 C. P. N. B. |
| 3719 | <i>Olene griseifecta</i> Dyar | 7 N. |
| 3750 | <i>Malacosma pluvialis</i> Dyar | 7 N. |
| 3945 | <i>Carsia paludata alpinata</i> Pack. | 8 L. |
| N.S. | <i>Orthanama evansi</i> McD. | 7 E. |
| 4148 | <i>Eupithecia obumbrata</i> Tayl. | 7 E. |
| N.S. | <i>Eupithecia nordeggensis</i> Cass. & Swett | 6—7 P. N. |
| 4601 | <i>Aethalura anticaria fumata</i> B. & McD. | 5 E. |
| 4627 | <i>Erannis vancouverensis</i> Hlst. | 9 E. |
| 4654 | <i>Ellopiia fiscellaria</i> Gn. | 9 E. |

AN APPEAL

Dr. Walther Horn, of the Deutsches Entomologisches Museum, Berlin-Dahlem, Gossler-Str. 20, Germany, writes that his Museum lacks financial support and is hardly able to continue its existence. The publication which he issues, namely "Entomologische Mitteilungen," is critically feeling the financial conditions of Germany, and especially the monetary exchange. Prices of printing have risen enormously, and hopes for the future are very dim. On account of the condition of the exchange, subscriptions to the journal, when sent in German marks, are not welcome, because of the constant and extremely rapid decline in value of the mark. Doctor Horn wishes that American subscribers to the journal should send their subscription price (\$1.25) in American or Canadian money; and if this is done, and if more subscriptions are sent in, he hopes that the journal may be able to continue.

AN APPARENTLY UNDESCRIBED SPECIES OF *SCELLUS*
(DOLICHOPODIDAE, DIPTERA)*BY C. HOWARD CURRAN,
Ottawa, Ont.***Scellus amplus* new species.**

Middle tibiae swollen and polished at apex, with a long spine just before the swelling beneath; front basitarsus with a long spine below before the middle and two or three smaller ones. Allied to *filiferus* Lw., but that species has numerous shorter spines on front basitarsi and dense ciliate hairs behind on the middle tibiae.

Length, almost 5 mm., wing 6.5 mm. *Male*. Face narrow, widened below, ochre yellow; front yellow with some ochre pollen; the ground color bronze green; occiput yellow, with cupreous reflections. Palpi yellow, proboscis black. Antennae black, shining; third joint elongate oval, sub-pointed above, a little swollen at the origin of the arista; not shining, with short whitish hair. Basal portion rather thick; last section slender, curved about its middle.

Thorax cupreous bronzed, rather thickly greyish pollinose, but not completely obscuring the ground color dorsum with two narrowly separated median brownish stripes, abbreviated behind, and an obscure, similarly colored stripe above the wings. Each of the few hairs arises from a black spot. Pleura much less densely pollinose. Scutellum moderately pollinose.

Legs black, femora bronzed, tibiae more greenish. Fore femora thick basally, gradually tapering. Anterior tibiae with the sub-basal spur black, its upper surface yellow pollinose, and with pale yellowish hairs; just below the origin of the spur, on the outer side a long black spine, with a shorter one above it; apex of tibiae produced as a rather broad, blunt lobe, which is of about the same length as the last tarsal joint; the lobe behind with three or four black bristles, its anterior and apical margin with a fringe of short, black hairs; immediately above the lobe in front the tibia is fringed with yellow hairs, dense and longer apically; beneath towards the front is a row of black bristles, longer apically, behind, on the swollen sub-basal fourth with much longer bristles. Front basitarsi postero-ventrally, just before the middle, with a long bristle and two or three short ones before it on posterior surface. Middle femora strongly arcuate, the apical two-thirds swollen, beneath, on the hind surface with a single row of black bristles, but these are mixed with the long, bristly hairs on the outer half, and not distinguishable; antero-dorsally is a row of five or six bristles on the apical third. Middle tibiae also moderately arcuate and swollen on basal portion, the posterior surface flattened; bearing long, not very abundant hairs which appear slightly tufted, and especially marked on the swollen area; above the middle on the outer side with two bristles and a slightly stouter one just before the apex; apex swollen and polished, more extensively so on the posterior side; just above this area on the inner side a stout, apically curved bristle. Middle basitarsi on either side below with a row of long spines. Hind femora laterally compressed, bearing dorsally two sub-apical bristles and a posterior one just before the apical dorsal one. Hind tibiae a little

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept., of Agric., Ottawa.

curved outward when viewed from the side; their outer surface with about four equally spaced spines, their inner, posterior apical half with nine similar spines not in a regular row; the opposite surface with more or less regular hairs. Coxae greyish white pollinose, with fine yellow pile, the front ones with a row of black bristles.

Wings largely clear hyaline, but beyond the middle the cells are cinereous, fading out apically; on the crossvein is a double, fused spot occupying all either end, and a second spot on the curve of the last section of the fourth vein; there is also a streak in the discal cell, and the area behind the fifth vein from the tip of the sixth vein is darker, but fades out marginally.

Abdomen on basal four segments and side of the fifth, coppery, the fifth and sixth bronze green; except the sixth segment, rather abundantly yellowish grey pollinose. Fillaments black basally, becoming brown, the apical half yellow: the basal portion, which is directed to the upper margin of the abdomen and about one-fifth of the second portion, which is directed backwards, is black; from there to about the second third of this portion it is yellowish brown, the last third yellow; the second portion is terminated in a broad, inferior ciliae of yellow hairs, which extend all along the yellow portion, and the third portion curves obliquely upwards from this point, again curving back, but the pointed end curved a little upward; the outer upper margin of the last section, not reaching to the tip, is ciliate, with pale yellowish or white hairs, which are directed downwards so as to cover the whole of this side of the filament. The terminal lamellae are fuscous, broadened, and then ending in a pair of parallel processes, which are long, flattened and sub-pointed, each bearing four or five not long black hairs apically.

Holotype—♂, Saanich, British Columbia, May 17, 1919, (W. Downes), No. 554 in the Canadian National Collection, Ottawa.

In Aldrich's key (Ent. News, XVIII, 136) this species traces out to *filiferus* Lw. The key may be modified by placing the figure "6" instead of *filiferus* and using the following couplet:

6. Middle tibia with the apex swollen and polished and bearing a stout, curved spine on the inner side before this area *amplus* Curran.
Middle tibia not with polished apex, but with such spine; with a preapical row of long, black ciliate hairs on the anterior surface *filiferus* Loew.

CHANGES OF NAMES

BY C. H. CURRAN,

Ottawa, Ont.

I am indebted to Mr. F. M. Hull for calling my attention to the fact that the name "*Stratiomyia velutina*" (Can. Ent., LIV, p. 233) is preoccupied (Bigot, Ann. Soc. Ent. Fr., p. 213, 1877) for a species from Chile. I propose the name "*griseata*" for the Canadian species.

In my article on the *sodalis* group appearing in this issue I overlooked the fact that Philippi (Verh. Zool.—Bot. Ges. Wien, XV, p. 747, 1865) had used the name "*Syrphus interruptus*" for a Chilean species. The name "*S. mallochii*" may be substituted for "*S. interruptus*" (antea, p. 61).

BOOK NOTICE

"Entomology with Special Reference to its Ecological Aspects," by Justus Watson Folsom, Sc. D., Assistant Professor of Entomology at the University of Illinois, third revised edition, with five plates and 308 text figures, Philadelphia; P. Blakiston's Son & Co., price \$4.00.

We were very glad indeed to receive the new edition of this well-known work. The author is to be congratulated on the choice of the additional text matter which has been added. The second revised edition, published in 1913, contained 402 pages with four plates and 304 text figures, whereas this new edition contains 502 pages—one hundred pages more, as well as one additional plate and four new illustrations. Some 250 titles have been added to the bibliography and an entirely new chapter on insect ecology is included. This new chapter discusses at considerable length and under definite sub-headings: I—Conditions of terrestrial existence; II—Conditions of aquatic existence; III—Environmental factors in general; IV—Classification of environments; V—Communities; VI—Examples of insect communities; and VII—Succession. In the words of the author, "This ought to prove useful, as the literature of the subject is scattered and there has been no similar comprehensive treatment of ecology from the viewpoint of the entomologist. In the preparation of this chapter, the author has been fortunate in having the expert advice of Professor V. E. Shelford, of the University of Illinois, who is not responsible, however, for any possible shortcomings in the chapter."

On page 187 we notice that the name *Cyaniris pseudargiolus* is used; according to the "Barnes & McDunnough Check List" this Lycaenid should be referred to as *Lycaenopsis pseudargiolus*, with the summer form as *neglecta* and *neglecta-major*, *pseudargiolus* proper replacing the name *violacea* as used by Folsom. Likewise, on the same page *Iphichides ajax* should be referred to as *Papilio marcellus* Cram. with the respective forms *lecontei*, *telaemonides* and *marcellus*.

A. G.

Have the following entomological literature for sale or exchange. Complete with index and unbound unless otherwise noted:

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